

TABLE 1.—Solar radiation intensities during April, 1927

Washington, D. C.

(Gram-calories per minute per square centimeter of normal surface)

Date	Sun's zenith distance										Local mean solar time	
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		Noon
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0		5.0
Apr. 6	mm.	6.27						1.02	0.68	0.57		6.50
Apr. 7		3.63	0.73	0.86	1.05	1.13	1.48	1.15				4.37
Apr. 11		2.62	0.86	1.01	1.11	1.32	1.52	1.29	1.09	1.00	0.86	2.49
Apr. 12		4.75	0.85	0.89	1.02	1.18	1.43					4.17
Apr. 14		2.87			1.14	1.30	1.44	1.25	1.08			3.63
Apr. 20		14.10					1.29	0.87				12.68
Apr. 23		3.00	0.77	0.92	1.06	1.24	1.39					3.30
Apr. 25		4.37	0.67	0.80	0.95	1.16	1.42					3.99
Apr. 28		3.81	0.66		0.98	1.19	1.49	1.19	0.91			4.57
Means			0.76	0.90	1.04	1.22	1.43	1.13	0.94	(0.78)	(0.86)	
Departures			+0.05	+0.14	+0.15	+0.14	+0.07	+0.03	+0.03	+0.03	+0.24	

Madison, Wis.

Apr. 5	5.16				1.30	1.53	1.29				5.56
Apr. 6	5.79					1.47	1.30				5.16
Apr. 20	3.15				1.29						3.15
Apr. 23	3.15			1.14	1.26	1.47					2.06
Apr. 27	6.27				1.11	1.31					6.50
Apr. 30	4.57				1.22	1.45	1.18				5.16
Means				(1.14)	1.24	1.45	1.26				
Departures				+0.05	+0.02	+0.03	+0.04				

Lincoln, Nebr.

Apr. 4	8.18					1.55	1.38	1.23	1.06	0.92	7.29
Apr. 6	5.36				1.13						5.16
Apr. 17	7.57	0.76	0.88	1.04	1.22	1.45					7.04
Apr. 18	8.48			0.90	1.06						13.13
Apr. 19	11.38						1.32	1.15	1.00		5.56
Apr. 21	2.87		1.05	1.20	1.37	1.57					2.26
Apr. 22	3.30	0.86	0.93	1.08	1.31	1.54					3.00
Apr. 25	6.27		0.91	1.06	1.24	1.43					8.18
Apr. 26	7.87			0.91	1.23		1.21				6.27
Apr. 27	5.79		0.60	0.83	1.05						6.27
Apr. 29	7.87					1.47	1.16	0.93	0.79	0.69	5.56
Means		(0.81)	0.87	1.00	1.20	1.50	1.27	1.10	0.95 (0.80)		
Departures		+0.07	+0.04	+0.02	-0.01	+0.05	+0.09	+0.12	+0.11	+0.09	

¹ Extrapolated.

TABLE 2.—Solar and sky radiation received on a horizontal surface

(Gram-calories per square centimeter of horizontal surface)

Week beginning—	Average daily radiation						Average daily departure from normal		
	Washington	Madison	Lincoln	Chicago	New York	Twin Falls	Washington	Madison	Lincoln
1927									
Apr. 2	259	315	344	383	283	497	-122	-67	-73
Apr. 9	430	373	155	284	423	467	+19	-28	-264
Apr. 16	402	326	438	271	278	536	-25	-78	-10
Apr. 23	404	378	485	333	373	648	-24	-51	+17
Deficiency since first of year on Apr. 29							-4,830	-2,975	-5,698

POSITIONS AND AREAS OF SUN SPOTS

[Communicated by Capt. Edwin T. Pollock, Superintendent U. S. Naval Observatory]

[Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, and Mount Wilson observatories]

Date	Eastern standard civil time	Heliographic		Area ¹	
		Longi- tude	Latitude	Spot	Group
1927	<i>h. m.</i>	<i>°</i>	<i>°</i>		
Mar. 9 (Yerkes).....	12 10	+6.9	-14.5	73	-----
Mar. 30 (Yerkes).....	12 40	-62.3	+16.0	97	-----
Apr. 3 (Naval Observatory).....	14 3	-56.0	+14.0	93	-----
		-43.0	+13.5		710
		-38.0	-24.0	62	-----
		-10.5	-15.0		20
		-8.5	+17.5	46	-----
		-4.0	-13.0		40
		+54.0	+15.5		62
		+61.5	-22.5		340
Apr. 4 (Mount Wilson).....	14 25	-41.0	+14.0	97	-----
		-41.0	+10.0	1	-----
		-27.5	+12.5		724
		-25.0	-24.5	20	-----
		-10.0	-16.0		2
		+6.0	+16.0	71	-----
		+7.0	-8.0		6
		+7.0	-14.0		6
		+12.0	+22.0		10
		+46.0	-14.0		4
		+70.0	+14.5	3	-----
		+73.0	-23.0		473
Apr. 5 (Yerkes).....	9 56	-80.0	-15.5	485	-----
		-30.5	+13.5	75	-----
		-24.0	+15.0	75	-----
		-19.0	+13.0	100	-----
		-15.0	+11.0	120	-----
		+16.0	+16.0	95	-----
		+25.0	+22.0	50	-----
		+79.0	-29.0	480	-----
Apr. 6 (Naval Observatory).....	11 46	-82.0	-17.0		247
		-69.0	-13.5		278
		-16.0	+14.5	62	-----
		-5.0	+14.0		463
		+30.0	+16.5	42	-----
		+37.0	+22.0		62
		+71.0	-13.5		123
Apr. 7 (Naval Observatory).....	11 47	-68.0	-17.0		278
		-55.0	-14.0		278
		+7.0	+12.5		463
		+42.5	+16.5	31	-----
		+50.0	+22.0		46
		+85.0	-15.0	123	-----
Apr. 10 (Naval Observatory).....	12 7	-79.0	+30.0	216	-----
		-78.0	-7.0		247
		-45.0	-22.5		46
		-38.5	+13.5		123
		-26.0	-17.5		278
		-14.0	-14.0		185
		+34.5	+13.5		31
		+51.0	+12.5		432
		+72.0	+5.0		62
Apr. 11 (Naval Observatory).....	11 51	-80.0	+11.0	309	-----
		-72.0	+33.0	741	-----
		-69.0	-7.0		46
		-68.0	-14.5		62
		-60.5	-7.5		93
		-29.0	-21.5		46
		-25.0	+14.0		108
		-20.0	-18.5	9	-----
		-10.5	-18.0		278
		-0.5	-13.0		139
		+63.0	+13.0		370
Apr. 12 (Naval Observatory).....	11 46	-67.0	+11.5		216
		-58.0	+32.5		216
		-57.0	-5.5	25	-----
		-53.0	-15.0		139
		-47.5	-7.5		31
		-15.0	-21.5		31
		-12.5	+13.5		77
		-0.5	-18.0		370
		+12.5	-13.0		139
		+79.0	+13.0		278
Apr. 14 (Naval Observatory).....	11 49	-49.5	+18.0		31
		-42.0	+11.0		77
		-30.5	+32.5		123
		-27.5	-15.0		185
		+11.5	-21.0		15
		+12.5	+14.5		123
		+21.5	+14.5		31
		+24.0	-19.0		432
		+39.5	-13.0		46

¹ Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere.

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic		Area	
		Longi- tude	Latitude	Spot	Group
Apr. 15 (Naval Observatory).....	h. m. 11 42	°	°		
		-37.0	+18.0	31	62
		-28.0	+11.0		154
		-27.0	-12.0		
		-13.5	+30.0	40	216
		-13.5	-15.0		
		+25.0	-11.0	25	
		+27.0	+14.5		123
		+34.5	+14.5	18	
		+37.0	-19.0		340
Apr. 16 (Naval Observatory).....	11 41	+32.5	-12.5		77
		-21.0	+21.0		19
		-17.5	+13.0		15
		-13.0	-10.0		247
		-10.0	+12.0		46
		-5.0	+36.5	31	
		-2.0	-14.0		185
		+2.0	+31.0	46	
		+37.0	-23.5	19	
		+43.0	+12.5		216
Apr. 17 (Naval Observatory).....	11 42	+49.5	-20.0		370
		+62.0	-16.0		62
		+1.0	-10.5		370
		+11.0	+30.5	31	
		+13.0	-14.0		139
		+54.0	-21.0		46
		+54.0	+14.0		185
		+63.0	-17.0		154
		+78.0	-11.5	62	
		-73.5	+9.5	108	
Apr. 18 (Naval Observatory).....	11 44	+14.5	-10.5		370
		+24.0	+30.5	25	
		+28.0	-14.0		139
		+67.0	+15.0		123
		+79.0	-17.0		185
		-87.0	-20.0	118	
		-57.0	+9.0		116
		-50.0	-18.0		8
		+27.0	-12.0		545
		+39.0	+30.0	18	
Apr. 19 (Mount Wilson).....	12 40	+45.0	-15.0		205
		+68.0	+26.0	32	
		+56.0	+13.0	80	
		-73.5	-19.5	62	
		-45.0	+9.5		46
		+34.5	-10.5	123	
Apr. 20 (Naval Observatory).....	11 49				

Positions and areas of sun spots—Continued

Date	Eastern standard civil time	Heliographic		Area	
		Longi- tude	Latitude	Spot	Group
Apr. 20 (Naval Observatory).....	h. m. 11 49	°	°		
		+44.0	-10.5	170	
		+49.5	+30.0	15	
		+57.0	-13.5		123
		+60.0	-20.0	123	
		-32.0	+9.5	31	
		-22.0	+24.5		31
		+48.0	-10.5	139	
		+58.5	-10.5	231	
		+70.0	-13.5		123
Apr. 21 (Naval Observatory).....	11 40	-78.0	-15.0		20
		-43.5	-20.0	55	
		-15.0	+8.0	28	
		-5.0	+24.0		88
		+70.0	-12.0		377
		+58.5	-15.0		93
		-34.0	-20.0	58	
		-6.5	+9.5	25	
		+3.0	+24.5		93
		+74.0	-10.0	154	
Apr. 22 (Mount Wilson).....	18 30	+85.0	-10.0	247	
		-46.0	-17.0		108
		-20.0	-20.0	62	
		+16.5	+24.0		108
		-76.5	+5.0	216	
		-33.0	-17.5		201
		-7.0	-20.0	46	
		+29.0	+24.0		93
		-59.0	+4.0	75	
		-41.5	+19.0		100
Apr. 23 (Naval Observatory).....	11 53	-16.0	+16.5		150
		+9.5	-20.5	50	
		+19.0	-17.5	25	
		+45.0	+25.0	50	
		+72.0	-8.0	75	
		-49.5	+4.5	170	
		-32.0	+21.0		93
		-6.0	+16.5		185
		+19.5	-20.0	31	
		+56.5	+24.5	31	
Apr. 24 (Naval Observatory).....	12 28	+35.5	+4.5	154	
		-17.5	+21.0		93
		+3.5	-17.5		93
		+9.5	-12.5		93
		+31.5	-20.0	31	
Apr. 25 (Naval Observatory).....	11 47				

AEROLOGICAL OBSERVATIONS

By L. T. SAMUELS

The month was characterized by free-air temperatures which were above normal, particularly at the higher levels. (See Table 1.) The departures were greatest from 2,000 meters to 3,000 meters at the southern stations. As might be expected under such conditions, the relative humidity was mostly below normal and the vapor-pressure departures were in general of the same sign as those for temperature.

A general excess of southerly winds occurred in the resultants for the month at all stations. (See Table 2.) The deviations from the normal were most pronounced at Royal Center and Ellendale. At the former station the northerly resultants contained a marked easterly component up to 1,250 meters instead of the more usual westerly; at Ellendale the resultant direction was south-westerly as compared to the normal northwesterly. In this connection it is interesting to find that the total precipitation at both of these stations exceeded all previous records for April since their establishment in 1918.

That a high lapse rate is not always a precursor of precipitation is shown in the kite records of Due West for April 26. A second flight was made in the afternoon at this station on account of the rapid fall in pressure. Both flights were made on the northern side of a tongue of high pressure extending inland over the South Atlantic and Gulf States. The wind direction changed but little with altitude, being westerly to west-south-

westerly at the surface and west-northwesterly above 3,000 meters. The following lapse rates prevailed during the day.

Time	M. S. L. (m.)	°C./100 m.
7:56 to 9:37 a. m.....	217 to 1,757..	0.62
9:37 to 10:12 a. m.....	217 to 1,757..	.98
1:30 to 2:12 p. m.....	217 to 2,061..	1.10
4:12 to 4:50 p. m.....	217 to 2,163..	1.06

These superadiabatic lapse rates resulted in strong convection, but owing to the low relative humidity, which for the most part was below 50 per cent, no cumulus clouds developed, the sky remaining clear throughout the day.

The heights to which the temperatures successively increased under the influence of air emanating from the rear of a slowly moving high pressure area are shown in the following table taken from the kite records of Broken Arrow for the 25th, 26th, and 27th.

M. S. L. (m.)	25th (°C.)	26th (°C.)	27th (°C.)
233.....	7.5	10.3	17.0
500.....	8.2	13.0	17.0
1,000.....	5.0	17.8	22.6
1,500.....	2.7	14.1	19.8
2,000.....	3.3	10.5	16.9
2,500.....	1.5	6.8	13.0
3,000.....	-0.2		9.0